IN THE CLAIMS:

Please cancel claims 8-14, 17, 26, 33-34 without prejudice or disclaimer, amend claims 1-4, 7, 15-16, 20-22, 26-27, 30, 35-37, and add new claims 40-65 as follows:

1. (Currently Amended) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

   a tunnel barrier layer;

   a first ferromagnetic material layer of the BCC structure formed on a first side of said tunnel barrier layer; and

   a second ferromagnetic material layer of the BCC structure formed on a second side of said tunnel barrier layer, wherein

   said tunnel barrier layer is formed by a single-crystalline (001) MgO_x $(0 < x < 1)$ ~~(001) layer~~ or a poly-crystalline MgO_x $(0 < x < 1)$ [[layer]] in which [[the]] (001) crystal plane is preferentially oriented.

2. (Currently Amended) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

   a tunnel barrier layer ~~comprising MgO(001)~~;

   a first ferromagnetic material layer comprising Fe(001) formed on a first side on said tunnel barrier layer; and

   a second ferromagnetic material layer comprising Fe(001) formed on a second side on said tunnel barrier layer, wherein

   said ~~MgO(001)~~ tunnel barrier layer is formed by a single-crystal (001) MgO_x $(0 < x < 1)$ ~~(001) layer~~ or a poly-crystal MgO_x $(0 < x < 1)$ [[layer]] in which [[the]] (001) crystal plane is preferentially oriented.

3. (Currently Amended) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

   a tunnel barrier layer ~~comprising MgO(001)~~;

   a first ferromagnetic material layer formed on a first side of said tunnel barrier layer and comprising a single-crystalline (001) layer or a poly-crystalline layer of Fe or an Fe alloy of the BCC structure, said polycrystalline layer having [[the]] (001) crystal plane preferentially oriented therein;

a second ferromagnetic material layer formed on a second side of said tunnel barrier layer and comprising a single-crystalline (001) layer or a poly-crystalline layer of Fe or an Fe alloy of the BCC structure, said polycrystalline layer having the (001) crystal plane preferentially oriented therein, wherein

said tunnel barrier layer is formed by a single-crystalline (001) MgO_x $(0 < x < 1)$ ~~(001) layer~~ or a poly-crystalline MgO_x $(0 < x < 1)$ [[layer]] in which [[the]] (001) crystal plane is preferentially oriented, wherein

a discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers is smaller than an ideal value in the case where the ~~MgO (001)~~ tunnel barrier layer is formed by a perfect single-crystal MgO.

4. (Currently Amended) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer of the BCC structure formed on a first side of said tunnel barrier layer;

a second ferromagnetic material layer of the BCC structure formed on a second side of said tunnel barrier layer, wherein

said tunnel barrier layer is formed by a single-crystalline (001) MgO_x $(0 < x < 1)$ ~~(001) layer~~ or a poly-crystalline MgO [[layer]] in which [[the]] (001) crystal plane is preferentially oriented, wherein

a discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers is smaller than an ideal value in the case where the ~~MgO (001)~~ tunnel barrier layer is formed by a perfect single-crystal MgO.

5. (Previously Presented) The magnetoresistive device according to claim 3, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

6. (Previously Presented) The magnetoresistive device according to claim 3, wherein

said discontinuous value is in the range of 0.10 to 0.85 eV.

7. (Currently Amended) A memory device comprising:

a transistor; and

a magnetoresistive device comprising a tunnel barrier layer; a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and a second ferromagnetic material layer formed on a second side of said tunnel barrier layer, wherein said tunnel barrier layer is formed by a single-crystalline <u>(001)</u> MgO_x <u>($0 < x < 1$)</u> ~~(001) layer~~ or a poly-crystalline MgO_x ($0 < x < 1$) [[layer]] in which [[the]] (001) crystal plane is preferentially oriented, wherein said magnetoresistive device is used as a load for said transistor.

8-14. (Cancelled)

15. (Currently Amended) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer and comprising an amorphous magnetic alloy; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier layer and comprising an amorphous magnetic alloy, wherein

said tunnel barrier layer is formed by ~~a single-crystalline MgO_x (001) or~~ a poly-crystalline MgO_x ($0 < x < 1$) [[layer]] in which [[the]] (001) crystal plane is preferentially oriented.

16. (Currently Amended) The magnetoresistive device according to claim 15, wherein a discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers is smaller than an ideal value in the case where the ~~MgO (001)~~ <u>tunnel</u> barrier layer is <u>formed by</u> a perfect single-crystal <u>MgO</u>.

17. (Cancelled).

18. (Previously Presented) The magnetoresistive device according to claim 16, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

19. (Previously Presented) The magnetoresistive device according to claim 16, wherein said discontinuous value is in the range of 0.10 to 0.85 eV.

20. (Currently Amended) A memory device comprising:

a transistor; and

a magnetoresistive device comprising a tunnel barrier layer; a first ferromagnetic material layer formed on a first side of said tunnel barrier layer and comprising an amorphous magnetic alloy; and a second ferromagnetic material layer formed on a second side of said tunnel barrier layer and comprising an amorphous magnetic alloy, wherein said tunnel barrier layer is formed by ~~a single-crystalline MgO_x (001) or~~ a poly-crystalline MgO_x $(0 < x < 1)$ [[layer]] in which [[the]] (001) crystal plane is preferentially oriented, wherein said magnetoresistive device is used as a load for said transistor.

21. (Currently Amended) A method of manufacturing a magnetoresistive device comprising:

preparing a substrate;

depositing a first ferromagnetic material layer comprising an amorphous magnetic alloy on said substrate;

forming an amorphous MgO layer on said first ferromagnetic material layer and then crystallizing said amorphous MgO layer by annealing so as to form a tunnel barrier layer comprising ~~a single-crystalline MgO_x (001) or~~ a poly-crystalline MgO_x $(0 < x < 1)$ in which [[the]] <u>a</u> (001) crystal plane is preferentially oriented; and

depositing a second ferromagnetic material layer comprising an amorphous magnetic alloy on said tunnel barrier layer.

22. (Currently Amended) The method of manufacturing the magnetoresistive device according to claim 21, wherein the step of forming said tunnel barrier layer comprising ~~said single crystalline MgO_x (001) or~~ said poly-crystalline MgO_x (0 < x <

1) in which [[the]] (001) crystal plane is preferentially oriented involves deposition by sputtering using a target with the value of x in MgO_x adjusted.

23. (Previously Presented) The magnetoresistive device according to claim 4, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

24. (Previously Presented) The magnetoresistive device according to claim 4, wherein said discontinuous value is in the range of 0.10 to 0.85 eV.

25. (Previously Presented) The memory device according to claim 7, wherein

the first ferromagnetic material layer and the second ferromagnetic material layer are each a BCC structure.

26. (Currently Amended) The memory device according to claim 7, wherein

~~the tunnel barrier layer comprises MgO(001), and~~

the first ferromagnetic material layer and the second ferromagnetic material layer each comprise Fe(001).

27. (Currently Amended) The memory device according to claim 7, wherein

~~the tunnel barrier layer comprises MgO(001),~~

the first ferromagnetic material layer and the a second ferromagnetic material layer each comprises a single-crystalline (001) [[layer]]or a poly-crystalline [[layer]] of Fe or an Fe alloy of the BCC structure, said polycrystalline [[layer]] having [[the]] (001) crystal plane preferentially oriented therein, and

a discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers is smaller than an ideal value in the case where the ~~MgO (001)~~ tunnel barrier layer is formed by a perfect single-crystal MgO.

28. (Previously Presented) The memory device of claim 27, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

29. (Previously Presented) The memory device of claim 27, wherein said discontinuous value is in the range of 0.10 to 0.85 eV.

30. (Currently Amended) The memory device according to claim 7, wherein

the first ferromagnetic material layer and the second ferromagnetic material layer are each a BCC structure, and

a discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers is smaller than an ideal value in the case where the ~~MgO (001)~~ tunnel barrier layer is formed by a perfect single-crystal MgO.

31. (Previously Presented) The memory device of claim 30, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

32. (Previously Presented) The memory device of claim 30, wherein said discontinuous value is in the range of 0.10 to 0.85 eV.

33-34. (Cancelled).

35. (Currently Amended) The magnetoresistive device according to claim [[17]]16, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

36. (Currently Amended) The magnetoresistive device according to claim [[17]]16, wherein said discontinuous value is in the range of 0.10 to 0.85 eV.

37. (Currently Amended) The memory device of claim 20, wherein the discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers is smaller than an ideal value in the case where the ~~MgO (001)~~ tunnel barrier layer is formed by a perfect single-crystal MgO.

38. (Previously Presented) The memory device of claim 20, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

39. (Previously Presented) The memory device of claim 20, wherein said discontinuous value is in the range of 0.10 to 0.85 eV.

40. (New) A method of manufacturing a magnetoresistive device comprising;

preparing a substrate;

depositing a first ferromagnetic material layer comprising an amorphous magnetic alloy on said substrate;

forming an amorphous MgO layer on said first ferromagnetic material layer and then crystallizing said amorphous MgO layer by annealing so as to form a tunnel barrier layer comprising a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented; and

depositing a second ferromagnetic material layer comprising an amorphous magnetic alloy on said tunnel barrier layer; and

annealing so as to crystallize said amorphous magnetic alloy.

41. (New) A method of manufacturing a magnetoresistive device of claim 40, wherein said ferromagnetic material is CoFeB alloy.

42. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented, and

a discontinuous value (the potential barrier height of the tunnel barrier) between the bottom of the conduction band of said tunnel barrier layer and the Fermi

energy of at least one of said first and said second ferromagnetic layers is in the range of 0.10 to 0.85 eV.

43. (New) A magnetoresistive device of claim 42, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

44. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented, and

a magnetoresistance ratio of said device is more than 70 %.

45. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented,

a magnetoresistance ratio of said device is more than 70%, and

a discontinuous value (the potential barrier height of the tunnel barrier), between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers, is in the range of 0.10 to 0.85 eV.

46. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer, and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented,

a magnetoresistance ratio of said device is more than 70%,

a discontinuous value (the potential barrier height of the tunnel barrier), between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers, is in the range of 0,10 to 0.85 eV, and

an output voltage of said device is more than 200 mV.

47. (New) A magnetoresistive device of claim 45, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

48. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising;

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said tunnel barrier layer is formed by a polycrystalline MgO_x ($0 < x -< 1$) in which (001) crystal plane is preferentially oriented, and

an output voltage of said device is more than 200 mV.

49. (New) A tunnel barrier layer on a ferromagnetic material layer, wherein said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented, and a discontinuous value (the potential barrier height of the tunnel barrier) is in the range of 0.10 to 0.85 eV.

50. (New) A tunnel barrier layer of claim 49, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

51. (New) A tunnel barrier layer

comprising a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented, and

having a discontinuous value (the potential barrier height of the tunnel barrier) is in the range of 0.10 to 0.85 eV.

52. (New) A tunnel barrier layer of claim 49, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

53. (New) A tunnel barrier layer used for a magnetoresistive device having an output voltage of more than 200 mV, wherein said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented.

54. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said first or second ferromagnetic material layer comprising an amorphous ferromagnetic alloy, and

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented.

55. (New) A magnetoresistive device of claim 54, wherein said ferromagnetic alloy is CoFeB alloy.

56. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer; and

a second ferromagnetic material layer formed on a second side of said tunnel barrier,

wherein

said first or second ferromagnetic material layer comprising an amorphous ferromagnetic alloy,

said tunnel barrier layer is formed by a poly-crystalline MgO_x $(0 < x < 1)$ in which (001) crystal plane is preferentially oriented, and

a discontinuous value (the potential barrier height of the tunnel barrier), between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers, is in the range of 0.10 to 0.85 eV.

57. (New) A magnetoresistive device of claim 56, wherein said discontinuous value is in die range of 0.2 to 0.5 eV.

58. (New) A magnetoresistive device of claim 56, wherein said ferromagnetic alloy is CoFeB alloy.

59. (New) A magnetoresistive device comprising a magnetic tunnel junction structure comprising:

a tunnel barrier layer;

a first ferromagnetic material layer formed on a first side of said tunnel barrier layer, and

a second ferromagnetic material layer formed on a second side of said tunnel

barrier,

wherein

said first or second ferromagnetic material layer comprising an amorphous ferromagnetic alloy,

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented,

a discontinuous value (the potential barrier height of the tunnel barrier), between the bottom of the conduction band of said tunnel barrier layer and the Fermi energy of at least one of said first and said second ferromagnetic layers, is in the range of 0.2 to 0.5 eV, and

an output voltage of said device is more than 200 mV.

60. (New) A tunnel barrier layer on ferromagnetic material layer, wherein said ferromagnetic material layer comprising an amorphous ferromagnetic alloy,

said tunnel barrier layer is formed by a poly-crystalline MgO_x ($0 < x < 1$) in which (001) crystal plane is preferentially oriented.

61. (New) A tunnel barrier layer of claim 60, wherein said ferromagnetic alloy is CoFeB alloy.

62. (New) A tunnel barrier layer of claim 60, wherein said tunnel barrier layer has a discontinuous value (the potential barrier height of the tunnel barrier) of 0.2 to 0.5 eV.

63. (New) A magnetoresistive device of claim 46, wherein said discontinuous value is in the range of 0.2 to 0.5 eV.

64. (New) A magnetoresistive device of claim 57, wherein said ferromagnetic alloy is CoFeB alloy.

65. (New) A tunnel barrier layer of claim 61, wherein said tunnel barrier layer has a discontinuous value (the potential barrier height of the tunnel barrier) of 0.2 to 0.5 eV.